DOCUMENT RESUME

ED 282 667 PS 016 646

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TITLE Early Development of the Low SES Infant Weighing Less Than 1001 Grams at Birth.
PUB DATE Apr 87
NOTE 11p.; Paper presented at the Biennial Meeting of the Society for Research in Child Development (Baltimore, MD, April 23-26, 1987).
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PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Behavior Problems; *Biological Influences; *Birth Weight; Followup Studies; *Hispanic Americans; *Individual Development; *Infants; *Poverty; Social Influences; Undocumented Immigrants
IDENTIFIERS *Developmental Patterns

ABSTRACT

To evaluate outcomes in infants of very low birth weight born in 1982-83 to families of extremely low socioeconomic status (SES), 33 infants who weighed less than 1001 grams at birth and survived the nursery period were followed for 1 year. The sample was 79 percent Hispanic and 58 percent female. Mean birth weight was 868 grams and mean gestational age was 28.5 weeks. Two infants died following discharge and six could not be located. Sixty percent of the developmental scores on the Gesell Schedules (n=22) at 40 weeks corrected chronological age (CCA) or the Bayley Scales of Infant Development (n=3) at 13 months CCA fell within normal range and 36 percent were in the abnormal range. Neurologically, 46 percent of the sample were functioning within normal range by the end of the first year, 36 percent were abnormal, and the remainder showed some indication of possible problems. Forty-one percent had weights below the tenth percentile and four infants were blind secondary to retinopathy of prematurity by the end of one year. Six infants evidenced behavioral problems, including tantrums, irritability, distractability, or frequent crying. Short-term outcome in this sample was similar to that reported for middle-class infants. It is concluded that biological factors appear to play a more significant role than environment during the first year of life, and that long-term study of these infants is needed to determine the impact of poor environment over time. (Author/RH)

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ED282667

EARLY DEVELOPMENT OF THE LOW SES INFANT WEIGHING LESS THAN 1001 GRAMS AT BIRTH

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Poster session presented at SRCD, Baltimore, Maryland, April, 1987.

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PS 016646

Abstract

To evaluate outcome in infants of very low birthweight born to extremely low SES families, 33 infants who weighed less than 1001 grams at birth and survived the nursery period were followed to one year. The infants were born during 1982-83 and were 79% Hispanic and 58% female. All were of very low SES, with the majority born to undocumented aliens unemployed or working as unskilled laborers. Mean birthweight was 866 grams and mean gestational age was 28.5 weeks.

Two infants died following discharge and six were lost to follow-up. Outcome to one year was available for 25 infants. Sixty percent of the developmental scores fell within normal range (d.q. $\geq$ 85) and 36% were in the abnormal range (d.q. $\leq$ 69), utilizing either the Gesell Schedules at 40 weeks CCA (n=22) or the Bayley at 13 months CCA (n=3). Neurologically, 46% of the sample were functioning within normal range by the end of the first year, 36% were abnormal, and the remainder showed some indication of possible problems. Forty-one percent had weights below the tenth percentile and four infants were blind secondary to retinopathy of prematurity by the end of one year. Six infants evidenced behavioral problems in terms of tantrums, irritability, distractability or frequent crying.

Short-term outcome in this sample is similar to that reported in middle-class infants. Biological factors appear to play a more significant role than environment during the first year of life. Long term study of these infants is needed to determine the impact of poor environment over time.

Early Development of the Low SES Infant Weighing Less Than 1001 Grams At Birth

As medical techniques in the nursery become increasingly sophisticated, more infants with extremely low birthweights (< 1001 grams) are surviving. This group has not only the problems of the slightly larger low birthweight infant, but the additional problems to the family in terms of longer hospital stays and greater fragility once discharged. At Women's Hospital, the maternity hospital of the Los Angeles County-University of Southern California Medical Center, a 54% increase in surviving infants who weighed less than 1001 grams was seen between 1982 and 1983. In 1982, only one of thirteen infants discharged from the nursery weighed less than 800 grams. This infant died during the first year of life. By 1983, eight infants (of twenty survivors) weighed less than 800 grams.

To date, although much is known regarding both short and long term outcome of the 1000 to 2500 gram infant, relatively little is known regarding the development of the infant weighing less than 1001 grams at birth. In addition, despite the fact that a preponderance of the very smallest infants come from very low income families, with poor nutrition and home environments lacking stimulation, most research has focused on middle-class samples which are less mobile and consequently easier to follow.

In order to determine short term outcomes and whether such outcomes differ from those previously reported for higher income groups, this investigation was planned to examine outcomes to one year in an indigent population.

Method

Subjects

Thirty-three infants weighing less than 1001 grams were born between January 1, 1982 and December 31, 1983, and discharged from Women's Hospital, LAC-USC Medical Center Special Care Nurseries. Birthweights ranged from 600 to 1000 grams, with a mean of 868 $\pm$ 106 grams. Gestational age was determined by the last menstrual period of the mother and confirmed by the Ballard Assessment of Gestational Age (Ballard et al., 1977). In the case of a discrepancy greater than two weeks between the two measures, the Ballard Assessment was utilized. Mean gestational age was 28.5 $\pm$ 2.6 weeks, with a range of 25 to 39 weeks. Seventeen infants were small-for-gestational age, based on a birthweight under the tenth percentile for gestational age

on the Lubchenco Intrauterine Growth Curve (Lubchenco et al., 1963).

The parents were, for the most part, indigent with a high percentage of immigrants, both documented and undocumented. Seventy-nine percent were Hispanic, 9% Caucasian, 9% Black, and 3% Oriental.

Fifty-eight percent (n=19) of the infants were female and 42% (n=14) male. This was not significantly different from the remainder of infants followed who weighed between 1001 and 1500 grams. That population was 50% (n=76) female and 50% male (n= 77).

Procedure

As part of a hospital follow-up program for infants weighing less than 1500 grams at birth, developmental assessments utilizing the Gesell Schedules (Gesell & Amatruda, 1947) were performed at 40 ± 2 weeks CCA (age corrected for prematurity). Infants were classified as developmentally normal if developmental quotient (d.q.) was greater than 84, suspect if d.q. fell between 70 and 84, and abnormal if d.q. was below 70. Neurological status was also evaluated by examining performance on the Gesell schedules (Knobloch et al., 1956; Parmalee, 1980) and by evaluating the primitive reflexes and the righting, tilting, and parachute reactions (Miliani-Comparetti & Gidoni, 1967). The infants were classified as neurologically normal if no motor or sensory dysfunction was observed, suspect if mild tone and postural deviation were noticed, and abnormal if the infant had severe sensory and motor dysfunction.

Three infants who missed the 40 week examination were seen by the clinic psychologist at a mean age of 13 ± 2.6 months for developmental evaluation with the Bayley Scales of Infant Development (Bayley, 1969). Two of the three were also given a neurological assessment.

Results

Two infants died following discharge and six (18%) could not be located. One year outcome was examined for the remaining 25 infants.

Twenty-two infants were evaluated at 40 weeks CCA with the Gesell Schedules. Their mean developmental quotient was 73.3 ± 30.9, with a range of 12-106. The remaining three infants were evaluated at a mean age of 13 ± 2.6 months with the Bayley Scales. Mean Bayley MDI was 76.7 ± 17.9, with a range of 56-88. Examining all twenty-five developmental scores, infants were separated into normal, suspect, and abnormal categories. Sixty percent (n=15) of the sample fell into normal range, 4% (n=1) were suspect,

and 36% (n=10) were abnormal. Table 1 shows a comparison between the under 1001 gram sample and the sample weighing between 1000 and 1500 grams by developmental outcome. Eighty-five percent of the larger birthweight group were normal and 7 1/2% were abnormal by one year (X^2 =14.89, p< .001).

As can be seen in Table 2, 46% of the under 1001 gram sample were neurologically normal and 36% were abnormal at age one compared with 69% and 10%, respectively, of the 1001-1500 gram group (X^2 =10.31, p < .01).

By one year of age, 41% (9/22) of the infants had weights remaining below the tenth percentile on standard growth curves. Sixteen percent (n=4) of the infants were blind secondary to retinopathy of prematurity.

Clinic charts were examined for reports of behavior problems by the examiner who conducted the developmental assessment and/or by the mother during assessment. Twenty-four percent (6/25) reportedly had temper tantrums, frequent crying, distractability, or irritability.

Developmental outcome was next examined by weight and gestational age groupings. As can be seen in Table 3, distribution across 100 gram weight groups was fairly even. A comparison of the normal and abnormal groups was not statistically significant (X^2 =2.93, n.s.). However, a statistically significant difference between gestational age groups (see Table 4) was seen when the normal and abnormal infants were compared (X^2 =6.44, p<.05), with the number of abnormal outcomes decreasing as gestational age increased.

Sex differences were also examined by developmental outcome. Mean developmental quotient for females was 76.6 $\pm$ 30.27, with a range of 12-106. For males, the mean was 70 $\pm$ 29.27, with a range from 31-105. This difference was statistically significant (t=3.01, p<.005).

Conclusion

In an attempt to determine the short term outcomes in a very low SES population of extremely low birthweight infants, follow-up information available for 33 infants was examined. Sixty percent of the sample was found to be functioning within normal developmental range. Although the mean developmental quotient in the sample (x=73) was considerably below reported test norms, it is similar to that reported by others investigating low birthweight populations (e.g.,Schachtel & Kapadia, 1984). In addition, the 33% rate of neurological abnormality at age one is well within the 20 to 50% range reported by other researchers. For example, Horgan et al. (1986) reported a

34% rate of impairment in a sample weighing less than 1001 grams at age two. Saigal et al. (1984), using a regional population in Canada weighing less than 1001 grams, found a 50% rate of impairment and Bull et al. (1985) reported 28% rate of neurological impairment and a 30% rate of developmental abnormality in an under 1001 gram sample.

Examination of developmental outcomes by 100 gram weight categories indicated a similar frequency of problems across weight groups. Gestational age categories, on the other hand, yielded some interesting findings. As gestational age decreased, significant increases were seen in the number of infants suffering developmental and neurological problems. This finding may indicate the utility of gestational age as a predictor of developmental dysfunction.

As might be expected for a sample with a large number of small-for-gestational-age infants, a large proportion of infants had weights which remained below the tenth percentile at one year. It is not yet known what role, if any, family nutritional habits play in the growth of this particular sample.

Somewhat surprising was the high percentage of infants reported to have behavior problems. However, some of the reported irritability may be related to impaired neurological functioning in the sample. Continued follow-up is important to determine whether such problems intensify or are resolved as parents become more comfortable handling the extremely low birthweight infant and as the infant himself becomes less medically fragile.

It is likely that the most serious neurological, developmental, and opthalmological problems have appeared by age one. Therefore, there is cause for cautious optimism regarding the development of the very low SES, extremely low birthweight infant. However, Dunn and coworkers (1980) claim that they have been unable to diagnose most minimal brain damage before age four. Thus, the next step will be to examine two and four year outcomes in this extremely low birthweight sample to determine the full range of problems and the impact of social status as these children grow and develop.

TABLE 1

Comparison of Developmental Outcomes (<1001 grams vs 1001-1500 grams)

	Abnormal	Suspect	Normal
≤ 1000	9 (36%)	1 (4%)	15 (60%)
1001-1500	8 (7.5%)	8 (7.5%)	92 (85%)

$X^2 = 14.89$, $p < .001$

TABLE 2

Comparison by Neurological Outcome

	Abnormal	Suspect	Normal
≤ 1000	8 (36%)	4 (18%)	10 (46%)
1001-1500	11 (10%)	22 (21%)	75 (69%)

$X^2 = 10.31$, $p < .01$

TABLE 3

Developmental Outcome By Weight Groups

	Abnormal	Suspect	Normal
600-699	1		
700-799	1	1	4
800-899	2		4
900-1000	6		6

TABLE 4

Developmental Outcome By Gestational Age

	Abnormal	Suspect	Normal
25-27 weeks	6		4
28-29 weeks	3	1	4
≥ 30 weeks	0		7

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